




Test Report

| | | |
|---|---|---|
| Test Report No..... : | TCT230508E001 | |
| Date of issue..... : | May 25, 2023 | |
| Testing laboratory | Shenzhen TCT Testing Technology Co., Ltd. | |
| Testing location/ address: | 2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China | |
| Applicant's name..... : | LINKCOM MANUFACTURING CO., LTD | |
| Address..... : | Building 1, No.21 Huanqi Avenue, Qishi Town Dongguan Guangdong Sheng China | |
| Manufacturer's name ... : | LINKCOM MANUFACTURING CO., LTD | |
| Address..... : | Building 1, No.21 Huanqi Avenue, Qishi Town Dongguan Guangdong Sheng China | |
| Standard(s) | ETSI EN 303 417 V1.1.1 (2017-09) | |
| Product Name..... : | wireless charging pad | |
| Trade Mark | N/A | |
| Model/Type reference..... : | OPP130, OPP002 | |
| Rating(s)..... : | DC 5V(Adapter input AC 230 V/ 50 Hz) | |
| Date of receipt of test item | May 08, 2023 | |
| Date (s) of performance of test..... : | May 08, 2023 - May 25, 2023 | |
| Tested by (+signature) ... : | Rleo LIU |  |
| Check by (+signature).... : | Beryl ZHAO |  |
| Approved by (+signature): | Tomsin |  |



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1. General Product Information

1.1. EUT description

| | |
|----------------------------|--------------------------------------|
| Product Name.....: | wireless charging pad |
| Model/Type reference.....: | OPP130 |
| Operation Frequency | 115.38kHz – 150.64kHz |
| Test Frequency.....: | 137.60kHz |
| Modulation.....: | Load modulation |
| Operational Mode.....: | Mode 4: energy transmission |
| Antenna Type.....: | Inductive loop coil Antenna |
| Rating(s).....: | DC 5V(Adapter input AC 230 V/ 50 Hz) |

1.2. Model(s) list

| No. | Model No. | Tested with |
|--------------|-----------|-------------------------------------|
| 1 | OPP130 | <input checked="" type="checkbox"/> |
| Other models | OPP002 | <input type="checkbox"/> |

Note: OPP130 is tested model, other models are derivative models. The models are identical in circuit and PCB layout, only different on the model names. So the test data of OPP130 can represent the remaining models.

2. Test Result Summary

| Radio Spectrum Matter (RSM) Part of Tx | | | | |
|--|------------------|--------------|----------------|--------|
| Test Item | Test Requirement | Test Method | Limit/Severity | Result |
| Permitted range of operating frequencies | Clause 4.3.2 | Clause 6.6.2 | Clause 4.3.2.3 | PASS |
| Operating frequency ranges | Clause 4.3.3 | Clause 6.6.2 | Clause 4.3.3.3 | PASS |
| H-field requirements | Clause 4.3.4 | Clause 6.6.2 | Clause 4.3.4.3 | PASS |
| Transmitter spurious emissions | Clause 4.3.5 | Clause 6.6.3 | Clause 4.3.5.3 | PASS |
| Transmitter out of band (OOB) emissions | Clause 4.3.6 | Clause 6.6.3 | Clause 4.3.6.3 | PASS |
| WPT system unwanted conducted emissions | Clause 4.3.7 | Clause 6.6.4 | Clause 4.3.7.3 | N/A |

| Radio Spectrum Matter (RSM) Part of Rx | | | | |
|--|------------------|--------------|----------------|--------|
| Test Item | Test Requirement | Test Method | Limit/Severity | Result |
| Receiver spurious emissions | Clause 4.4.1 | Clause 6.3.2 | Clause 4.4.1 | PASS |
| Receiver blocking | Clause 4.4.2 | Clause 6.3.2 | Clause 4.4.2 | N/A |

Note:

1. PASS: Test item meets the requirement.
2. N/A: Test case does not apply to the test object.
3. The test result judgment is decided by the limit of test standard.

3. General Information

3.1. Test environment and mode

| Item | Normal condition |
|-------------------------|--------------------------------------|
| Temperature | +25°C |
| Voltage | DC 5V(Adapter input AC 230 V/ 50 Hz) |
| Humidity | 20%-95% |
| Atmospheric Pressure: | 1008 mbar |
| Test Mode: | |
| Operational Mode | Mode 4: energy transmission |

3.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Equipment | Model No. | Serial No. | FCC ID | Trade Name |
|-----------|-----------|----------------|--------|------------|
| Adapter | EP-TA200 | R37M4PR3QD1SE3 | / | SAMSUNG |
| Coil Load | / | / | / | / |

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

3.3. Test Instruments List

| Radiated Emission | | | | |
|-------------------|------------|--------------|---------------|---------------|
| Name | Model No. | Manufacturer | Date of Cal. | Due Date |
| EMI Test Receiver | ESIB7 | R&S | Jul. 04, 2022 | Jul. 03, 2023 |
| Spectrum Analyzer | FSQ40 | R&S | Jul. 04, 2022 | Jul. 03, 2023 |
| Pre-amplifier | 8447D | HP | Jul. 04, 2022 | Jul. 03, 2023 |
| Broadband Antenna | VULB9163 | Schwarzbeck | Jul. 06, 2022 | Jul. 05, 2024 |
| Coaxial cable | RC-18G-N-M | SKET | Feb. 25, 2022 | Feb. 24, 2024 |
| Coaxial cable | RC_40G-K-M | SKET | Feb. 25, 2022 | Feb. 24, 2024 |
| Loop antenna | FMZB1519B | Schwarzbeck | Jun. 12, 2022 | Jun. 11, 2024 |
| Spectrum Analyzer | N9020A | Agilent | Jul. 05, 2022 | Jul. 04, 2023 |
| DC Power Supply | KR3005K | Kingrang | Jul. 05, 2022 | Jul. 04, 2023 |

4. Facilities and Accreditations

4.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098

SHENZHEN TONGCE TESTING LAB

Designation Number: CN1205

The testing lab has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

SHENZHEN TONGCE TESTING LAB

CAB identifier: CN0031

The testing lab has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

4.2. Location

Shenzhen TCT Testing Technology Co., Ltd.

Address: 2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

TEL: +86-755-27673339

4.3. Measurement Uncertainty

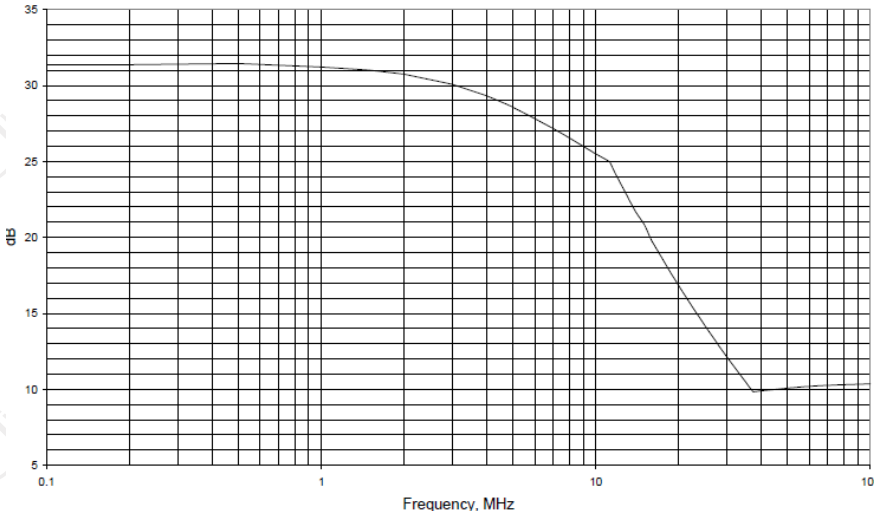
The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

| No. | Item | MU |
|-----|---|---------------------------|
| 1 | Conducted Emission | ± 3.10 dB |
| 2 | RF power, conducted | ± 0.12 dB |
| 3 | Spurious emissions, conducted | ± 0.11 dB |
| 4 | All emissions, radiated(<1 GHz) | ± 4.56 dB |
| 5 | All emissions, radiated(1 GHz - 18 GHz) | ± 4.22 dB |
| 6 | All emissions, radiated(18 GHz- 40 GHz) | ± 4.36 dB |
| 7 | Temperature | $\pm 0.1^{\circ}\text{C}$ |
| 8 | Humidity | $\pm 1.0\%$ |

5. Transmitter Requirement

5.1. Radiated H-field requirement

5.1.1. Test Specification

| Test Requirement: | EN 303 417clause 4.3.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|--|---|---|----------|-------------------|----|--|-------------------|---|------------|-------------------|---|------------|-------------------|----|--|-------------------|---|------------|-------------------|----|--|--------------------|------|--|-------------------|----|--|-------------------|----|--|
| Test Method: | EN 303 417clause 6.2.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Receiver Setup | <p style="text-align: center;">Table 3: H-field limits</p> <table border="1"> <thead> <tr> <th>Frequency range [MHz]</th> <th>H-field strength limit [dBμA/m at 10 m]</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>0,019 ≤ f < 0,021</td> <td>72</td> <td></td> </tr> <tr> <td>0,059 ≤ f < 0,061</td> <td>69,1 descending 10 dB/dec above 0,059 MHz</td> <td>See note 1</td> </tr> <tr> <td>0,079 ≤ f < 0,090</td> <td>67,8 descending 10 dB/dec above 0,079 MHz</td> <td>See note 2</td> </tr> <tr> <td>0,100 ≤ f < 0,119</td> <td>42</td> <td></td> </tr> <tr> <td>0,119 ≤ f < 0,135</td> <td>66 descending 10 dB/dec above 0,119 MHz</td> <td>See note 1</td> </tr> <tr> <td>0,135 ≤ f < 0,140</td> <td>42</td> <td></td> </tr> <tr> <td>0,140 ≤ f < 0,1485</td> <td>37,7</td> <td></td> </tr> <tr> <td>0,1485 ≤ f < 0,30</td> <td>-5</td> <td></td> </tr> <tr> <td>6,765 ≤ f < 6,795</td> <td>42</td> <td></td> </tr> </tbody> </table> <p>NOTE 1: Limit is 42 dBμA/m for the following spot frequencies: 60 kHz ± 250 Hz and 129,1 kHz ± 500 Hz. NOTE 2: At the time of preparation of the present document the feasibility of increased limits for high power wireless power transmission systems to charge vehicles [i.4] was prepared. New specific requirements for such systems (e.g. higher H-field emission limits in the 79 - 90 kHz band) will be reflected within a future revision of the present document.</p> | Frequency range [MHz] | H-field strength limit [dBμA/m at 10 m] | Comments | 0,019 ≤ f < 0,021 | 72 | | 0,059 ≤ f < 0,061 | 69,1 descending 10 dB/dec above 0,059 MHz | See note 1 | 0,079 ≤ f < 0,090 | 67,8 descending 10 dB/dec above 0,079 MHz | See note 2 | 0,100 ≤ f < 0,119 | 42 | | 0,119 ≤ f < 0,135 | 66 descending 10 dB/dec above 0,119 MHz | See note 1 | 0,135 ≤ f < 0,140 | 42 | | 0,140 ≤ f < 0,1485 | 37,7 | | 0,1485 ≤ f < 0,30 | -5 | | 6,765 ≤ f < 6,795 | 42 | |
| | Frequency range [MHz] | H-field strength limit [dBμA/m at 10 m] | Comments | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0,019 ≤ f < 0,021 | 72 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0,059 ≤ f < 0,061 | 69,1 descending 10 dB/dec above 0,059 MHz | See note 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0,079 ≤ f < 0,090 | 67,8 descending 10 dB/dec above 0,079 MHz | See note 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0,100 ≤ f < 0,119 | 42 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0,119 ≤ f < 0,135 | 66 descending 10 dB/dec above 0,119 MHz | See note 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0,135 ≤ f < 0,140 | 42 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0,140 ≤ f < 0,1485 | 37,7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0,1485 ≤ f < 0,30 | -5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6,765 ≤ f < 6,795 | 42 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Limit: | <p>The H-field limit in dBμA/m at 3 m, H_{3m}, is determined by the following equation: $H_{3m} = H_{10m} + C_3$ where: H_{10m} is the H-field limit in dBμA/m at 10 m distance according to the present document; and C₃ is a conversion factor in dB determined from figure H.2.</p>  <p>H_{10m} = 42 dBμA/m @ 10m; C₃ = 31.5dB</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test Procedure: | Refer to EN 303 417clause 6.2.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test Instrument: | Reference to Item 3.3 for details | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test Mode: | Reference to Item 3.1 for details | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test Result: | PASS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.1.2. Test Result

| Frequency of Max. Emission Level | Measuring Bandwidth | H-field Level | Limit in Table 4 |
|----------------------------------|---------------------|------------------|----------------------|
| 137.60kHz | 2.21kHz | 10.5dB μ A/m | 42.0dB μ A/m@10m |

Remark: 1. When the device is in working mode, rotated about all 3 axis (X, Y & Z) to obtain worst position, the emissions worst-case (Z axis) are shown in Test Results of the following pages.
2. The frequency point is selected at maximum power.



5.2. Operating Frequency range

5.2.1. Test Specification

| | |
|--------------------------|-----------------------------------|
| Test Requirement: | EN 303 417clause 4.3.3 |
| Test Method: | EN 303 417clause 6.2.2 |
| Limit: | 100kHz-300kHz |
| Test Procedure: | Refer to EN 303 417clause 6.2.2 |
| Test Instrument: | Reference to Item 3.3 for details |
| Test Mode: | Reference to Item 3.1 for details |
| Test Result: | PASS |

5.2.2. Test Result

| Bandwidth Measured (kHz) | | Limit (kHz) | |
|--------------------------|-------------------|-------------|--------|
| Lowest frequency | Highest frequency | Lower | Higher |
| 115.38 | 150.64 | 100 | 300 |

5.3. Transmitter out of band (OOB) emissions

5.3.1. Test Specification

| | |
|--------------------------|---|
| Test Requirement: | EN 303 417 clause 4.3.6 |
| Test Method: | EN 303 417 clause 6.2.3 |
| Limit: | <p>Figure 5: Out of band and spurious domain of a multi - frequency system (during one WPT system cycle time)</p> |
| Test Procedure: | Refer to EN 303 417 clause 6.2.3 |
| Test Instrument: | Reference to Item 3.3 for details |
| Test Mode: | Reference to Item 3.1 for details |
| Test Result: | PASS |

5.3.2. Test Result

| Frequency range (KHz) | | Emission Level (dbuA/m) | Limit (dbuA/m) | Result |
|-----------------------|--------|-------------------------|----------------|--------|
| f _{SL} | 108.75 | 25.45 | 32.55 | Pass |
| f _L | 115.38 | 28.53 | 32.81 | Pass |
| f _H | 150.64 | 28.53 | 32.81 | Pass |
| f _{SH} | 157.27 | 25.66 | 32.62 | Pass |

5.4. Spurious Emission

5.4.1. Test Specification

| Test Requirement: | EN 303 417 clause 4.3.5 & clause 4.4.1 | | | | | | | | | | | | | | | | | | |
|--------------------------|--|--|------------------------------|-------------------------------|-----------|--|-------------|---------|---|------------|------------------|---|--|-----------|------|--------|---------|------|------|
| Test Method: | EN 303 417 clause 6.2.3 | | | | | | | | | | | | | | | | | | |
| Limit: | <p>Frequencies <30 MHz</p> <p style="text-align: center;">Table 4</p> <table border="1"> <thead> <tr> <th>State (see note)</th> <th>Frequency 9 kHz ≤ f < 10 MHz</th> <th>Frequency 10 MHz ≤ f < 30 MHz</th> </tr> </thead> <tbody> <tr> <td>Operating</td> <td>27 dBμA/m at 9 kHz descending 10 dB/dec</td> <td>-3,5 dBμA/m</td> </tr> <tr> <td>Standby</td> <td>5,5 dBμA/m at 9 kHz descending 10 dB/dec</td> <td>-25 dBμA/m</td> </tr> </tbody> </table> <p>NOTE: "Operating" means mode 2, 3 and 4 according to Table 2; "standby" means mode 1 according to Table 2.</p> <p>Frequencies ≥30 MHz</p> <p style="text-align: center;">Table 5</p> <table border="1"> <thead> <tr> <th>State (see note)</th> <th>47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz</th> <th>Other frequencies between 30 MHz to 1 000 MHz</th> </tr> </thead> <tbody> <tr> <td>Operating</td> <td>4 nW</td> <td>250 nW</td> </tr> <tr> <td>Standby</td> <td>2 nW</td> <td>2 nW</td> </tr> </tbody> </table> <p>NOTE: "Operating" means mode 2, 3 and 4 according to Table 2; "standby" means mode 1 according to Table 2.</p> | State (see note) | Frequency 9 kHz ≤ f < 10 MHz | Frequency 10 MHz ≤ f < 30 MHz | Operating | 27 dBμA/m at 9 kHz descending 10 dB/dec | -3,5 dBμA/m | Standby | 5,5 dBμA/m at 9 kHz descending 10 dB/dec | -25 dBμA/m | State (see note) | 47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz | Other frequencies between 30 MHz to 1 000 MHz | Operating | 4 nW | 250 nW | Standby | 2 nW | 2 nW |
| State (see note) | Frequency 9 kHz ≤ f < 10 MHz | Frequency 10 MHz ≤ f < 30 MHz | | | | | | | | | | | | | | | | | |
| Operating | 27 dBμA/m at 9 kHz descending 10 dB/dec | -3,5 dBμA/m | | | | | | | | | | | | | | | | | |
| Standby | 5,5 dBμA/m at 9 kHz descending 10 dB/dec | -25 dBμA/m | | | | | | | | | | | | | | | | | |
| State (see note) | 47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz | Other frequencies between 30 MHz to 1 000 MHz | | | | | | | | | | | | | | | | | |
| Operating | 4 nW | 250 nW | | | | | | | | | | | | | | | | | |
| Standby | 2 nW | 2 nW | | | | | | | | | | | | | | | | | |
| Test Procedure: | Refer to clause 6.2.3 | | | | | | | | | | | | | | | | | | |
| Test Instrument: | Reference to Item 3.3 for details | | | | | | | | | | | | | | | | | | |
| Test Mode: | Reference to Item 3.1 for details | | | | | | | | | | | | | | | | | | |
| Test Result: | PASS | | | | | | | | | | | | | | | | | | |
| Remark | The standby mode is too lower than the limit, so not show in this report. | | | | | | | | | | | | | | | | | | |

5.4.2. Test Result

| operation mode | | | | |
|--------------------------|---|--------|-------|------------|
| Maximum Frequency MHz | Spurious Emission position and Level | | Limit | Over Limit |
| | Polarization | dBm | dBm | dBm |
| 55.36 | V | -80.40 | -54 | -26.40 |
| 173.180 | V | -77.02 | -36 | -41.02 |
| 188.110 | V | -72.32 | -54 | -18.32 |
| 196.750 | V | -72.57 | -54 | -18.57 |
| 208.580 | V | -69.43 | -54 | -15.43 |
| 55.36 | H | -79.12 | -54 | -25.12 |
| 173.180 | H | -77.85 | -36 | -41.85 |
| 188.110 | H | -69.91 | -54 | -15.91 |
| 196.750 | H | -80.43 | -54 | -26.43 |
| 208.580 | H | -71.06 | -54 | -17.06 |

Note: 1. The standby mode is too lower than the limit, so not show in this report.
2. The frequency below 30MHz is too lower than the limit, so not show in this report.

6. Receiver Requirement

6.1. Receiver Blocking

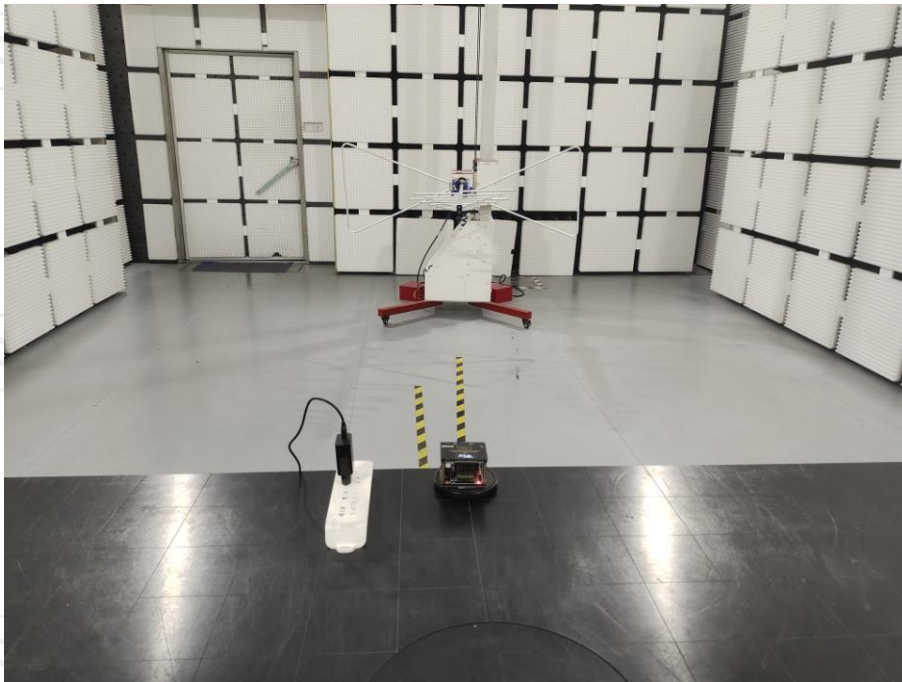
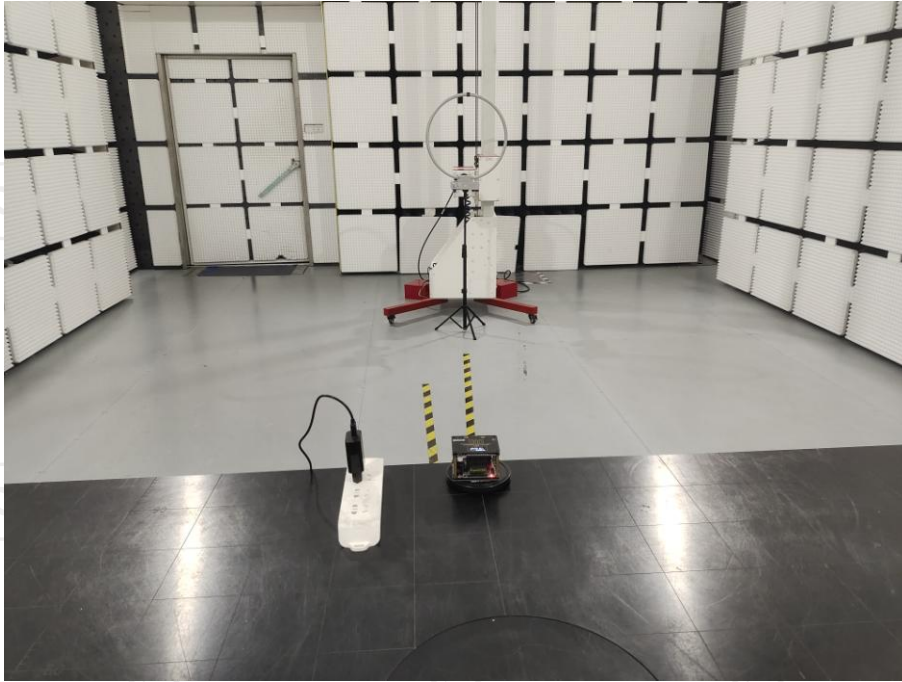
6.1.1. Test Specification

Test result:

This requirement applies to all WPT systems operation in Mode 1, Mode 2 and Mode 3, so Not applicable.

7. Photographs of Test Configuration

Radiated Emission



8. Photographs of EUT

Refer to the test report No. TCT230508E002

*******END OF REPORT*******